

Botanical view of the Baya Weaver's choices in India

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ABSTRACT

The Baya Weaver birds rely on the plants for the nesting process and food. The plant species used by the Baya Weaver in India for food, nest building material, nest site and roosting are provided here. Abandoned nests of the Baya Weavers are occupied by the Indian Silverbill birds was discussed and photographs were provided.

Key Words: Grass, Nest, *Ploceus philippinus*, Sedge, Shrub, Tree

1. INTRODUCTION

Baya Weavers (*Ploceus philippinus*) are docile, intelligent and social birds found in the Indian subcontinent and Southeast Asia. Non breeding plumage female and male looks similar to female house sparrow (*Passer domesticus*), but can be differentiated by stout conical bill, short square cut tail, dark streaked fulvous brown above and plain whitish fulvous below. Non breeding male and female looks similar, but breeding male has yellow breast, cream buff below, bright yellow crown, upper parts dark brown streaked with yellow and blackish brown bill (Ali, 2002). Four species of *Ploceus* are found in India (Grewal *et al.*, 2016; Grimmett *et al.*, 2016), namely *Ploceus benghalensis* (Black-breasted Weaver), *P. manyar* (Streaked Weaver), and *P. megarhynchus* (Finn's Weaver) and *P. philippinus* (Baya Weaver). The present study mainly focused on plant species used by *P. philippinus* (Figure 1) for food, nest building material, nest site and roosting in Andhra Pradesh, Bihar, Chhattisgarh, Goa, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh and West Bengal.

Nest building and nest site selection is a well programmed behavioral trait of birds (Rahmani and Sankaran, 1990). The nest site selection also reflects the ability of a bird to understand the ecological factors, coexistence of different species and impress its mate (Martin, 1996). The Baya Weaver's breeding season starts during the monsoon (Rasmussen and Anderton, 2005). They start building their nests in colonies and few young males build the experimental nests between reeds (Pandey, 1991; Abdulali and Ambedkar, 1984). The males display to females by flapping their wings and calling while hanging from their partially built nests (Figure 2). The females inspect the nests of males and if they are found suitable then they signal their acceptance. Once mating is

completed, the male completes the nest by adding the entrance tunnel and female particularly involved on the interiors. Males build many partial nests at same time and begin courting with other females at other partially constructed nests as both male and female birds are polygamous. Baya Weaver males weave the pendulous retort shaped nests, with a central nesting chamber and a long vertical tubular side entrance to the chamber (Figure 3) about 18 days with halfway helmet stage (Asokan *et al.*, 2008). This plant-bird interaction document will reveal a few keystone plant species for Baya Weaver and Silverbill birds for their existence.



Figure 1. A–B. Baya Weaver Male; C–D. Baya Weaver Female; E. Foraging flock; F–G. Feeding on grains; H. Feeding on insect.



Figure 2. A–D. Baya Weaver male display; E–F. Female acceptance sign; G–H. Male and female involvement in weaving the nest exterior and interior.

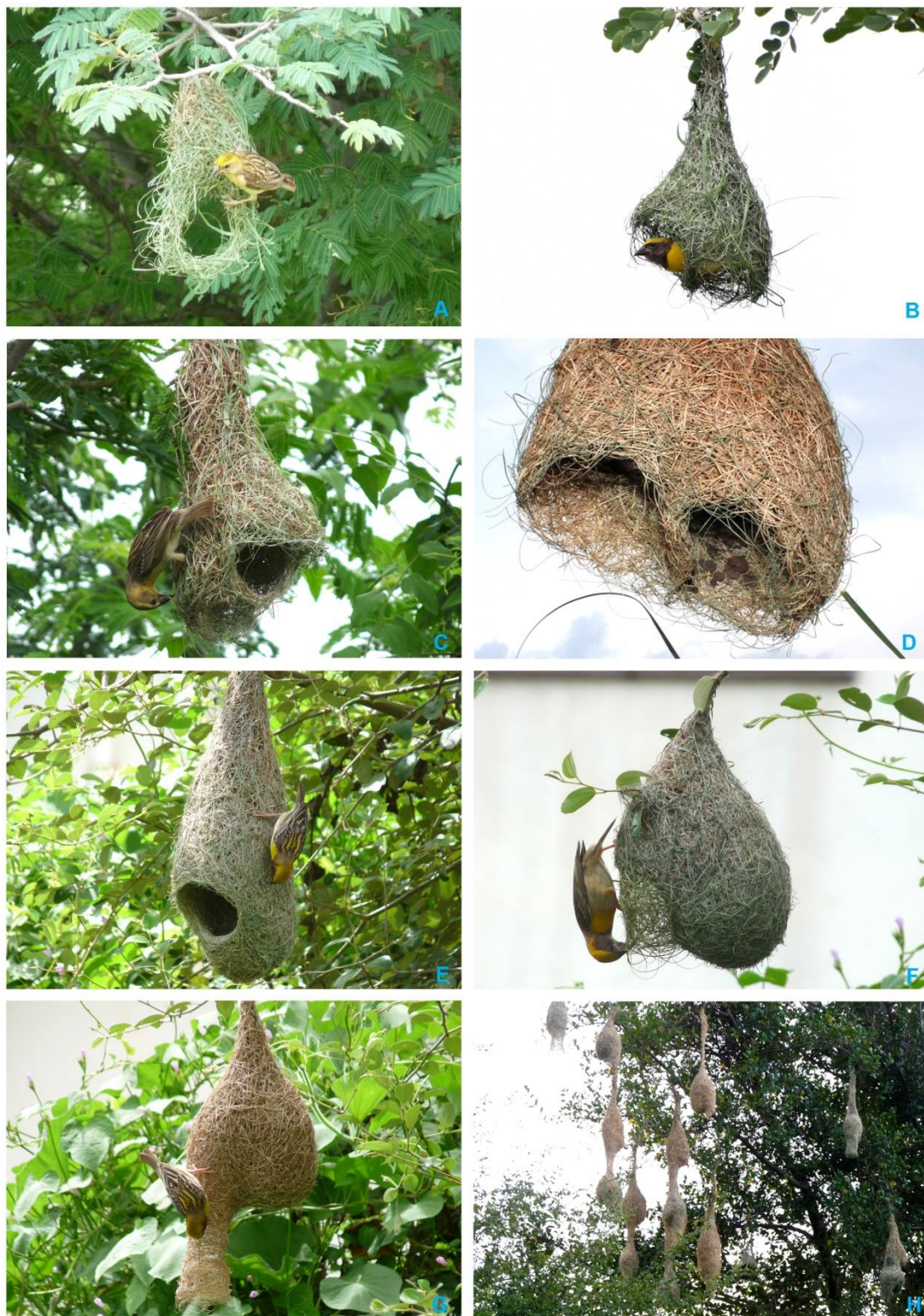


Figure 3. A–H. Baya Weaver nest building stages.

2. MATERIAL AND METHODS

During the field explorations from the year 2002 to 2020 under different projects, authors recorded the data on plant-animal interactions in field books. In these explorations, we also observed and recorded the plant species used by Baya Weaver for food, nest building material, nest site and roosting in Andhra Pradesh, Bihar, Chhattisgarh, Goa, Jharkhand, Karnataka, Madhya Pradesh,

Maharashtra, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh and West Bengal. The plants which are used by Baya Weaver were photographed and identified with the help of relevant literature. Nikon DSLR cameras with telephoto lens Nikkor 70–300, Nikkor 200–500 and Panasonic Point Shoot cameras were used to capture the birds. Photographs captured opportunistically wherever the Baya Weaver bird movement was more and few photographs captured at selective timeframe especially when female bird involved in the nest building. The breeding behaviour of Baya Weaver was also documented. Based on the Baya Weaver calls and forage movements, the nesting sites were located near cultivated fields, water bodies and along forest edges. Nests were also recorded in urban areas among thorny trees and ornamental palm trees.

3. RESULTS AND DISCUSSION

The Baya Weaver prefers the nesting sites near water bodies, cultivated fields and along forest edges because of the easy availability of nest building materials and food. Thorny trees and shrubs provide the great grip to weave the nest at beginning and also safeguard from the ground predators (Davis, 1974). We observed that, *Acacia nilotica* and *Prosopis juliflora* are the most preferred thorny trees for Baya Weaver. Apart from thorny plants, they also choose high foliage trees such as *Aegle marmelos*, *Albizia amara*, *Albizia lebbeck*, *Bauhinia racemosa*, *Butea monosperma* and species of *Ficus* to build the nest as they get more insects and larvae to feed their chick in the monsoon (Figure 4). *Acacia leucophloea*, *Albizia amara* and *Streblus asper* are the most preferred plants by Baya Weaver at dry deciduous forests in southern India. As Kirkpatrick (1952) and Gupta (1995) stated, Baya Weaver also chooses the electric lines, telephone lines which are passing through agriculture fields and avenue trees to build the nests. The nests are woven with long strips of bulrush or cattail, grasses, rushes, sedges and long torn strips of palm fronds which were given in the table 1. Indumentum on the grass leaves and waxy layers of bulrush and rushes has the hydrophobicity which keeps the nests water resistant from monsoon showers. We have noticed that, the abandoned nests of the Baya Weavers are occupied by the Indian Silverbill birds and completing their breeding cycle. The Indian Silverbills were observed quality of the nest and location of few abandoned nests of Baya Weaver on *Lannea coromandelica* at Manasa Hills, Rajendra Nagar, Hyderabad before they occupied them (Figure 5).

Table 1: Plant species used by Baya Weaver for food (FD), nest building material (NBM), nest site (NS) and roosting (RT)

S. No.	Scientific Name	Family	Habit	Purpose
1	<i>Acacia auriculiformis</i> A. Cunn. ex Benth.	Mimosaceae	Tree	NS
2	<i>Acacia catechu</i> (L. f.) Willd.	Mimosaceae	Tree	NS
3	<i>Acacia chundra</i> (Roxb. ex Rottler) Willd.	Mimosaceae	Tree	NS
4	<i>Acacia leucophloea</i> (Roxb.) Willd.	Mimosaceae	Tree	NS
5	<i>Acacia mellifera</i> (Vahl) Benth.	Mimosaceae	Tree	NS
6	<i>Acacia planifrons</i> Wight & Arn.	Mimosaceae	Tree	NS
7	<i>Acacia nilotica</i> (L.) Willd. ex Delile subsp. <i>nilotica</i>	Mimosaceae	Tree	NS
8	<i>Acacia nilotica</i> (L.) Willd. ex Delile subsp. <i>indica</i> (Benth.) Brenan	Mimosaceae	Tree	NS
9	<i>Acrachne racemosa</i> (B. Heyne ex Roth) Ohwi	Poaceae	Herb	FD
10	<i>Aegle marmelos</i> (L.) Corrêa	Rutaceae	Tree	NS
11	<i>Albizia amara</i> (Roxb.) Boivin	Mimosaceae	Tree	NS
12	<i>Albizia lebbeck</i> (L.) Benth.	Mimosaceae	Tree	NS
13	<i>Albizia procera</i> (Roxb.) Benth.	Mimosaceae	Tree	NS
14	<i>Albizia saman</i> (Jacq.) F. Muell.	Mimosaceae	Tree	NS
15	<i>Alloteropsis cimicina</i> (L.) Stapf	Poaceae	Herb	FD
16	<i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guill. & Perr.	Combretaceae	Tree	NS
17	<i>Anogeissus pendula</i> Edgew.	Combretaceae	Tree	NS
18	<i>Arundinella pumila</i> (Hochst. ex A. Rich.) Steud.	Poaceae	Herb	FD
19	<i>Arundinella setosa</i> Trin.	Poaceae	Herb	FD
20	<i>Arundo donax</i> L.	Poaceae	Subshrub	NBM, NS, RT
21	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Tree	NS

22	<i>Balanites roxburghii</i> Planch.	Zygophyllaceae	Tree	NS
23	<i>Bambusa bambos</i> (L.) Voss	Poaceae	Shrub	NBM, NS
24	<i>Bauhinia racemosa</i> Lam.	Fabaceae	Tree	NS
25	<i>Borassus flabellifer</i> L.	Arecaceae	Tree	NBM, NS
26	<i>Brachiaria eruciformis</i> (Sm.) Griseb.	Poaceae	Herb	FD
27	<i>Brachiaria remota</i> (Retz.) Haines	Poaceae	Herb	FD
28	<i>Brachiaria semiundulata</i> (Hochst. ex A. Rich.) Stapf	Poaceae	Herb	FD
29	<i>Butea monosperma</i> (Lam.) Taub.	Fabaceae	Tree	NS
30	<i>Carissa carandas</i> L.	Apocynaceae	Shrub	NS
31	<i>Carissa spinarum</i> L.	Apocynaceae	Shrub	NS
32	<i>Caryota urens</i> L.	Arecaceae	Tree	NBM, NS
33	<i>Cassia fistula</i> L.	Caesalpinaceae	Tree	NS
34	<i>Chrysopogon zizanioides</i> (L.) Roberty	Poaceae	Herb	NBM, RT
35	<i>Cocos nucifera</i> L.	Arecaceae	Tree	NBM, NS
36	<i>Cordia dichotoma</i> G. Forst.	Boraginaceae	Tree	NS
37	<i>Cyperus alopecuroides</i> Rottb.	Cyperaceae	Herb	NBM
38	<i>Cyperus articulatus</i> L.	Cyperaceae	Herb	NBM
39	<i>Cyperus corymbosus</i> Rottb.	Cyperaceae	Herb	NBM
40	<i>Cyperus digitatus</i> Roxb.	Cyperaceae	Herb	NBM
41	<i>Cyperus exaltatus</i> Retz.	Cyperaceae	Herb	NBM
42	<i>Cyperus pangorei</i> Rottb.	Cyperaceae	Herb	NBM
43	<i>Cyrtococcum trigonum</i> (Retz.) A. Camus	Poaceae	Herb	FD
44	<i>Dactyloctenium aegyptium</i> (L.) Willd.	Poaceae	Herb	FD
45	<i>Dalbergia sissoo</i> DC.	Fabaceae	Tree	NS
46	<i>Delonix regia</i> (Bojer ex Hook.) Raf.	Caesalpinaceae	Tree	NS
47	<i>Diplachne fusca</i> (L.) P. Beauv. ex Roem. & Schult.	Poaceae	Herb	FD
48	<i>Dypsis lutescens</i> (H.Wendl.) Beentje & J. Dransf.	Arecaceae		NS, NBM
49	<i>Echinochloa colona</i> (L.) Link	Poaceae	Herb	FD
50	<i>Echinochloa crus-galli</i> (L.) P. Beauv.	Poaceae	Herb	FD, NBM
51	<i>Echinochloa esculenta</i> (A. Braun) H. Scholz	Poaceae	Herb	FD, NBM
52	<i>Echinochloa frumentacea</i> Link	Poaceae	Herb	FD, NBM
53	<i>Echinochloa oryzoides</i> (Ard.) Fritsch	Poaceae	Herb	FD, NBM
54	<i>Echinochloa picta</i> (J. Koenig) P.W. Michael	Poaceae	Herb	FD, NBM
55	<i>Echinochloa stagnina</i> (Retz.) P. Beauv.	Poaceae	Herb	FD, NBM
56	<i>Eleocharis dulcis</i> (Burm. f.) Trin. ex Hensch.	Cyperaceae	Herb	FD, NBM
57	<i>Eleusine coracana</i> (L.) Gaertn.	Poaceae	Herb	FD, NBM
58	<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	Herb	FD, NBM
59	<i>Eragrostis atrovirens</i> (Desf.) Trin. ex Steud.	Poaceae	Herb	NBM
60	<i>Eragrostis gangetica</i> (Roxb.) Steud.	Poaceae	Herb	NBM
61	<i>Eragrostis japonica</i> (Thunb.) Trin.	Poaceae	Herb	NBM
62	<i>Eragrostis nutans</i> (Retz.) Nees ex Steud.	Poaceae	Herb	NBM
63	<i>Eragrostis riparia</i> (Willd.) Nees	Poaceae	Herb	NBM
64	<i>Eragrostis tenuifolia</i> (A. Rich.) Hochst. ex Steud.	Poaceae	Herb	NBM
65	<i>Eriochloa fatmensis</i> (Hochst. & Steud.) Clayton	Poaceae	Herb	FD, NBM
66	<i>Eriochloa procera</i> (Retz.) C.E. Hubb.	Poaceae	Herb	FD, NBM
67	<i>Ficus arnottiana</i> (Miq.) Miq.	Moraceae	Tree	NS
68	<i>Ficus benghalensis</i> L.	Moraceae	Tree	NS

69	<i>Ficus microcarpa</i> L. f.	Moraceae	Tree	NS
70	<i>Ficus racemosa</i> L.	Moraceae	Tree	NS
71	<i>Ficus religiosa</i> L.	Moraceae	Tree	NS
72	<i>Hymenachne amplexicaulis</i> (Rudge) Nees	Poaceae	Herb	FD
73	<i>Ischaemum afrum</i> (J.F. Gmel.) Dandy	Poaceae	Herb	NBM
74	<i>Juncus bufonius</i> L.	Juncaceae	Herb	FD, RT
75	<i>Juncus effusus</i> L.	Juncaceae	Herb	FD, RT
76	<i>Juncus inflexus</i> L.	Juncaceae	Herb	FD, RT
77	<i>Juncus prismatocarpus</i> R.Br.	Juncaceae	Herb	FD, RT
78	<i>Lannea coromandelica</i> (Houtt.) Merr.	Anacardiaceae	Tree	NS
79	<i>Leptochloa chinensis</i> (L.) Nees	Poaceae	Herb	FD
80	<i>Leptochloa panicea</i> (Retz.) Ohwi	Poaceae	Herb	FD
81	<i>Leptochloa uniflora</i> Hochst. ex A. Rich.	Poaceae	Herb	FD
82	<i>Limonia acidissima</i> L.	Rutaceae	Tree	NS
83	<i>Mallotus philippensis</i> (Lam.) Müll.Arg.	Euphorbiaceae	Tree	NS
84	<i>Manilkara zapota</i> (L.) P. Royen	Sapotaceae	Tree	NS
85	<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Rubiaceae	Tree	NS
86	<i>Oryza rufipogon</i> Griff.	Poaceae	Herb	FD
87	<i>Oryza sativa</i> L.	Poaceae	Herb	FD, NBM
88	<i>Panicum brevifolium</i> L.	Poaceae	Herb	FD
89	<i>Panicum curviflorum</i> Hornem.	Poaceae	Herb	FD
90	<i>Panicum humile</i> Steud.	Poaceae	Herb	FD
91	<i>Panicum miliaceum</i> L.	Poaceae	Herb	FD
92	<i>Panicum notatum</i> Retz.	Poaceae	Herb	FD
93	<i>Panicum paludosum</i> Roxb.	Poaceae	Herb	FD
94	<i>Panicum repens</i> L.	Poaceae	Herb	FD
95	<i>Panicum sparsicomum</i> Nees ex Steud.,	Poaceae	Herb	FD
96	<i>Panicum sumatrense</i> Roth	Poaceae	Herb	FD
97	<i>Paspalum distichum</i> L.	Poaceae	Herb	FD
98	<i>Paspalum scrobiculatum</i> L.	Poaceae	Herb	FD
99	<i>Pennisetum glaucum</i> (L.) R. Br.	Poaceae	Herb	FD, NBM
100	<i>Phoenix sylvestris</i> (L.) Roxb.	Arecaceae	Tree	NS, NBM
101	<i>Phragmites karka</i> (Retz.) Trin. ex Steud.	Poaceae	Herb	NS, NBM, RT
102	<i>Phyllanthus reticulatus</i> Poir.	Euphorbiaceae	Shrub	NS
103	<i>Pithecellobium dulce</i> (Roxb.) Benth.	Mimosaceae	Tree	NS
104	<i>Pogonatherum paniceum</i> (Lam.) Hack.	Poaceae	Herb	NBM
105	<i>Pongamia pinnata</i> (L.) Pierre	Fabaceae	Tree	NS
106	<i>Prosopis cineraria</i> (L.) Druce	Mimosaceae	Tree	NS
107	<i>Prosopis juliflora</i> (Sw.) DC.	Mimosaceae	Tree	NS
108	<i>Roystonea regia</i> O.F.Cook	Arecaceae	Tree	NS, NBM
109	<i>Saccharum spontaneum</i> L.	Poaceae	Herb	NBM, RT
110	<i>Saccharum officinarum</i> L.	Poaceae	Herb	NBM, RT
111	<i>Sacciolepis indica</i> (L.) Chase	Poaceae	Herb	FD
112	<i>Sacciolepis interrupta</i> (Willd.) Stapf	Poaceae	Herb	NBM, RT
113	<i>Sacciolepis myosuroides</i> (R. Br.) Chase ex E.G. Camus & A. Camus	Poaceae	Herb	FD

114	<i>Sesbania aculeata</i> (Schreb.) Pers.	Fabaceae	Shrub	NS
115	<i>Sesbania sesban</i> (L.) Merr.	Fabaceae	Shrub	NS
116	<i>Setaria flavida</i> (Retz.) Veldkamp	Poaceae	Herb	FD
117	<i>Setaria geminata</i> (Forssk.) Veldkamp	Poaceae	Herb	FD
118	<i>Setaria intermedia</i> Roem. & Schult.	Poaceae	Herb	FD
119	<i>Setaria italica</i> (L.) P. Beauv.	Poaceae	Herb	FD
120	<i>Setaria pumila</i> (Poir.) Roem. & Schult.	Poaceae	Herb	FD
121	<i>Setaria punctata</i> (Burm. f.) Veldkamp	Poaceae	Herb	FD
122	<i>Setaria verticillata</i> (L.) P. Beauv.	Poaceae	Herb	FD, NBM
123	<i>Solanum diphyllum</i> L.	Solanaceae	Subshrub	FD
124	<i>Sorghum bicolor</i> (L.) Moench	Poaceae	Herb	FD, NBM
125	<i>Sorghum halepense</i> (L.) Pers.	Poaceae	Herb	FD, NBM
126	<i>Sorghum nitidum</i> (Vahl) Pers.	Poaceae	Herb	NBM
127	<i>Sporobolus coromandelianus</i> (Retz.) Kunth	Poaceae	Herb	FD
128	<i>Sporobolus diandrus</i> (Retz.) P. Beauv.	Poaceae	Herb	FD, NBM
129	<i>Streblus asper</i> Lour.	Moraceae	Tree	NS
130	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Tree	NS
131	<i>Tabebuia rosea</i> (Bertol.) Bertero ex A. DC.	Bignoniaceae	Tree	NS
132	<i>Thysanolaena latifolia</i> (Roxb. ex Hornem.) Honda	Poaceae	Herb	NBM, RT
133	<i>Triticum aestivum</i> L.	Poaceae	Herb	FD, NBM
134	<i>Triticum turgidum</i> L. subsp. <i>dicoccum</i> (Schrank ex Schübl.) Thell.	Poaceae	Herb	FD, NBM
135	<i>Typha angustifolia</i> L.	Typhaceae	Herb	NBM, NS, RT
136	<i>Typha domingensis</i> Pers.	Typhaceae	Herb	NBM, NS, RT
137	<i>Typha elephantina</i> Roxb.	Typhaceae		NBM, NS, RT
138	<i>Urochloa deflexa</i> (Schumach.) H. Scholz	Poaceae	Herb	FD
139	<i>Urochloa distachya</i> (L.) T.Q. Nguyen	Poaceae	Herb	FD
149	<i>Urochloa kurzii</i> (Hook. f.) T.Q. Nguyen	Poaceae	Herb	FD
150	<i>Urochloa maxima</i> (Jacq.) R.D. Webster	Poaceae	Herb	FD, NBM, RT
151	<i>Urochloa mutica</i> (Forssk.) T.Q. Nguyen	Poaceae	Herb	FD, NBM
152	<i>Urochloa panicoides</i> P. Beauv.	Poaceae	Herb	FD, NBM
153	<i>Urochloa ramosa</i> (L.) T.Q. Nguyen	Poaceae	Herb	FD
154	<i>Urochloa reptans</i> (L.) Stapf	Poaceae	Herb	FD
155	<i>Urochloa setigera</i> (Retz.) Stapf	Poaceae	Herb	FD
156	<i>Urochloa trichopus</i> (Hochst.) Stapf	Poaceae	Herb	FD, NBM
157	<i>Wodyetia bifurcata</i> A.K. Irvine	Arecaceae	Tree	NBM, NS
158	<i>Ziziphus jujuba</i> Mill.	Rhamnaceae	Tree	NS
159	<i>Ziziphus mauritiana</i> Lam.	Rhamnaceae	Tree	NS
160	<i>Ziziphus nummularia</i> (Burm.f.) Wight & Arn.	Rhamnaceae	Shrub	NS
161	<i>Ziziphus oenopolia</i> (L.) Mill.	Rhamnaceae	Shrub	NS
162	<i>Ziziphus xylopyrus</i> (Retz.) Willd.	Rhamnaceae	Shrub	NS



Figure 4. A. Baya Weaver nests on branches above the water; B. Nests on tall palm trees; C–D. Nests on thorny plants; E–H. Nests on densely foliage trees.



Figure 5. A–H. Abandoned nests of Baya Weaver using by Indian Silverbill birds.

Position of the nest on the trees also plays an imperative role to keep the nest stable from the wind and avoid the threats from the predators. Generally, the Baya Weaver selects the branches which are on the opposite side of the wind flow (Ali, 1931; Sharma, 1990) and we have observed most of the nests in south-east corner of a tree in southern India. Male will keep the wet mud pellets and dung pellets in the helmet shaped nest to maintain the balance of the nest from wind and later, these pellets are used by females (Davis, 1973) for making the plastered chamber inside the nest (Figure 3). They select the tree branches which are spreading

over the water to avoid the predators and in this case also most preferable plants are *Acacia nilotica*, *Phyllanthus reticulatus* and *Prosopis juliflora*. Further, they choose tall palm trees like Toddy (*Borassus flabellifer*), Coconut tree (*Cocos nucifera*) and wild dates (*Phoenix sylvestris*) to keep the nest at a high raised position to avoid the threats from reptiles. In the urban areas, Butterfly palm (*Dyopsis lutescens*), Foxtail palm (*Wodyetia bifurcata*) and Royal Palm (*Roystonea regia*) are the most chosen plants by Baya Weaver. Generally, nest predation by Crows, Pied Mynas, raptors, reptiles and rodents can be seen. To avoid these common predators, Baya Weaver chooses shallow water bodies and builds their nests on species of *Typha*. Baya Weavers forage in flocks for grains at cultivated fields and sometimes this bird is considered as an agriculture pest (Sengupta, 1974) but, in contrast, they also feed on different insects which are causing the damage to the cultivated crops (Figure 1). They pick up millets, rice, pulses, germinating seeds from the cultivation, food grains offered by the people and roost in reed-beds. They also feed on larvae, flies, small frogs, geckos, molluscs, seeds of grasses and sedges. 162 species of angiosperms used by Baya Weaver for food, nest building material, nest site and roosting are listed with family and habit (Table 1).

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Conflicts of interest: The authors declare no conflict of interest.

Data and materials availability

All data associated with this study are present in the paper.

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